

## TOBACCO INDUSTRY RESEARCH COMMITTEE

150 EAST FORTY SECOND STREET NEW YORK 17, N.Y.

Application for Research Grant

Date: July 16, 1959

1. Name of Investigator: Benson B. Roe, M.D. and Leon Goldman, M.D.  
Associate Professor of Surgery Professor and Chairman
2. Title: and Chief, Cardiac Surgery Department of Surgery
3. Institution & Address: School of Medicine  
University of California  
3rd and Parnassus  
San Francisco 22, California
4. Project or Subject: The Action of Negatively Charged Ions on Tracheo-Bronchial Ciliary Action in the Human Patient.
5. Detailed Plan of Procedure: In vitro studies on animal trachea by Doctor Albert P. Krueger, Professor of Bacteriology, Emeritus, at the University of California, and living animal studies on tissue susceptibility to trauma have indicated significantly detrimental effects of positively charged ions in the inhaled air. Negative ions have been demonstrated to produce increased ciliary action and to promote tracheal cleansing. Little work on this subject has been done in this country though extensive studies have been reported in Europe. The potential clinical value of this work is significant and of particular importance is its use in the postoperative patient to aid mucous evacuation and avoid atelectasis.  
  
Method: Safe, effective air negative ionization apparatus has been developed by the Wesix Electric Company in San Francisco. Using this apparatus or modifications of it, a combined clinical-pathological study is planned.  
  
A. Clinical studies will utilize a double blind method of evaluating postoperative respiratory complications in patients who will be exposed to a negative ion atmosphere. It is planned to use a group of goose-necked ionizers at the patient's bedside, some of which are dummies not identifiable to those making the clinical evaluation.

Negative ion apparatus may be rigged into anesthesia machines and it is planned to carry out this work in conjunction with Dr. Stuart Cullen in the Anesthesia Department to evaluate clinically the effect of negative ionization during anesthesia. It is significant that high pressure with turbulent flow (such as anesthesia machines and air conditioning) produces positive ionization in the very areas where it is theoretically most detrimental.

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B. Pathological studies: Microscopic quantitative measurement of ciliary action will be studied in a constant temperature negative ion atmosphere using a stroboscopic light. Specimens of freshly resected human bronchi will be obtained from the operating theater in this Hospital and elsewhere to verify the human application of animal studies performed by Dr. Krueger. After establishing the ciliary response of bronchial mucosa with controlled ionization in the laboratory, it is planned to study the differential effect on ciliary action of various anesthetic agents with and without negative ions in the anesthetic apparatus.

Approximately 3,000 general anesthetics are given annually in the University of California Hospital. It is planned to begin with a pilot clinical study on the Thoracic Surgical Service to establish well-defined criteria for the definition of "pulmonary complication". Thereafter it is planned to study a wide variety of surgical patients, subjecting all patients included in this series to identical negative ion "treatment". Approximately one-half of the patients will be "treated" with dummy ionizers. For a statistical validity of this comparative evaluation it will probably be necessary to study several hundred patients.

(One full-time

Salaries (senior technician**	\$ 4,980.00
Expendable Supplies	500.00
Permanent Equipment	1,700.00
Overhead (15%)	1,092.00
Other (Transportation to obtain specimens)	100.00
	\$ 8,372.00

7. Anticipated Duration of Work: Two to three years.

8. Facilities and Staff Available: Pathological Laboratory and clinical services of the University of California Hospital.

9. Additional Requirements: None.

10. Additional Information (Including relation of work to other projects and other sources of supply):

Pilot studies have been supported by the Committee on Research of our School of Medicine.

Make check payable to The Regents of the University of California.

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\*\* It is anticipated that a full-time technician will be needed to maintain and operate the apparatus for counting ciliary action in the surgical specimens. Also, this technician will aid in the gathering and tabulating of the clinical data.

/s/ Benson B. Roe, M.D.  
Director of Project

/s/ James H. Corley  
Vice President-Governmental Relations  
and Projects